Director Charles Groat Remarks and Slide Show at the 2005 EPA Science Forum, Washington, D.C., May 16, 2005

"Environmental Collaborations: Nationally and Across the Globe"

(Slide 1 Introduction: Environmental Collaborations: Nationally and Across the Globe

There are many successes to report on the remarkable journey toward improving Global Earth Observation capabilities internationally and for the Nation. We have moved toward global collaboration because of a growing need to understand earth systems and processes, and to better serve societal needs. In response we have gathered as a community to find ways to leverage our technical capabilities to achieve an interoperable system of systems that allows for efficient and effective data integration and exchange. I am grateful to be here to speak to the topic of collaboration and to outline the U.S. perspective.

Slide 2 Shortcomings of Current Earth Observation Efforts

There are a lot of challenges associated with collecting, managing, accessing and using environmental data and information that are still facing the geospatial community. Some of the shortcomings are:

Lack of access to data
Eroding technical infrastructure
Spatial and temporal gaps in data sets
Data interoperability
Uncertainty about data continuity
Inadequate user involvement
Lack of relevant processing systems to transform data

We also can't forget the incompatibility of policy and the financial challenges involved in maintaining and improving current and future technology.

Slide 3 GEOSS

The premise behind the global Earth observation system of systems is simple – even if not-necessarily-easy to implement. **There are currently thousands, if not millions, of observation points collecting data around the world. Unfortunately, they operate, for the most part, independently of one another.**

By establishing an integrated global system, participants seek **to improve coordination of strategies and systems for observations of the Earth - from *in situ*, aircraft, and satellite networks.** Participants also hope to identify measures to **minimize data gaps** – with the intent to move toward a comprehensive, coordinated, and sustained Earth observation system of systems.

Data exchange is a key element of GEOSS. Under the Declaration which was agreed on in July 2003, participants will exchange data in a full and open manner with minimum time delay and minimum cost, recognizing relevant international instruments and national policies and legislation.

If successful, by fully networking these systems, we will advance our understanding of the Earth's environment and **improve decision-makers' abilities to address pressing policy issues.**

Slide 4 Earth Observation Summits

Collaboration for GEOSS began at the highest levels of government. GEOSS is actively supported by the ministers of sixty countries and more than forty participating regional and international organizations. This international political support can bring greater success.

Slide 5 GEOSS Development Process

First Earth observation summit in Washington D.C. in July 2003. In her address to the ministers, Interior Secretary Gail Norton pointed out "...free and open sharing of scientific data is a necessity for ensuring success in gathering knowledge of environmental conditions..."

This summit established the ad hoc group on Earth observation to guide the development of the GEOSS 10-year implementation plan. A major priority for GEO was to involve developing countries, seek input from users and the scientific and technical community.

Slide 6 Outcomes of EO Summit III

The immediate outcome of the third summit was the endorsement of thee GEOSS 10-year plan, but the lasting contributions have been the collaborative agreements formed between nation's since that time, for example, on May 4th the USGS and the Earth Sciences Sector of Natural Resources Canada signed a MOU, which will lead to better integration of hazard information over all of North America. It is through the use of common standards and interoperable systems that GEOSS has the power to provide benefit to the citizens of every nation.

Slide 7 First Meeting : GEO l

The 12-member Executive Committee has members from Africa (2), Americas (3), Asia and Oceania (3), Commonwealth of Independent States (1), Europe (3).

The Co-Chairs: US, EC (developed); China, South Africa (developing)

Slide 8 GEOSS Focus

More than 50 countries and the European Commission have agreed to focus on nine overarching societal benefit areas. This is a significant accomplishment given the scope of the mandate and the breadth of participants.

These are the nine societal benefit areas: Natural & Human induced disasters; Climate Variability & Change; Biodiversity; Weather Information, Forecasting & Warning; Human Health & Well-Being; Water Resources; Terrestrial, Coastal & Marine Ecosystems; Sustainable Agriculture & Desertification, and Energy Resources.

Note: The International community calls "biodiversity" "oceans," and calls "terrestrial, coastal & marine ecosystems" "ecosystems"

These benefit areas **have far-reaching implications for decision-makers at the international, regional, and local levels**. For the next few minutes, I want to provide some specific examples.

Slide 9 Natural & Human induced disasters

Natural disasters **afflict all regions of the wo**rld, and improved global disaster reduction and warning is a shared, global need. **Disasters killed 500,000 people and caused $750 billion of damage over the decade 1990-1999**, according to data presented in the "Living with Risk" report of the UN International Strategy for Disaster Reduction (ISDR).

This year there was the Tsunamis in the Indian Ocean, four hurricanes in the U.S., Mount St. Helens awakened in the eve of her 25th Anniversary, and Landslides plagued southern California. All brought the relevance of this Benefit area to the forefront. The risk indicates what GEOSS could enable and the desired outcome, which is Science and technology working together for a desired societal outcome – early warning and greater response time.

Slide 10 Wildfire

Wildfire is another area in which GEOSS can be particularly useful. Wildfires have **global implications and Integrated Earth Observation systems can provide information to provide better tracking and prediction capabilities.** A desired outcome of the international and the U.S. plan is the development of a global disaster reduction and warning system for hazards such as earthquakes, volcanoes, floods, hurricanes and drought. Although damage cannot be completely avoided, better coordination of observation systems and data will reduce losses and help protect the public.

Slide 11 Terrestrial, Coastal, and Marine Ecosystems

[Regional scale initiatives] In the Caribbean, NOAA is involved in White Water to Blue Water, an international effort to promote the practice of integrated watershed and marine ecosystem-based management in support of sustainable development.

The project involves governments, intergovernmental organizations, universities, and the private sector. WW2BW was intended to help implement US Presidential Type II initiatives from WSSD.

WW2BW is an effort to understand and recognize connection between sectors; Sustainable development requires cooperation among the full range of upstream and downstream stakeholders.
An ocean observation system for the Caribbean region (including Remote sensing platforms) is a critical component. Data will be widely available and used by technical experts, policymakers and the public in their decision making regarding the development of watershed and marine ecosystems.

The benefits could be far-reaching – healthy, well-managed and productive marine and coastal ecosystems that support economies and livelihoods in coastal countries. This is the basis for **economic growth (development)** and social well-being.

In 2002, Caribbean destinations had 35.2m visitors ($18.8 Billion) - **$ tied to environment**

Slide 12 Improve Human Health & Well-Being

We are only beginning to comprehend impact of environmental phenomena on human health issues, for example, the U.S. is examining linkages between ocean phenomena and human health environmental trends.

An estimated 300-500 million people worldwide are infected with malaria each year; about 1 million die from the disease. Trends show the "normal annual cycle of malaria is intensified during El Niño events (local, regional, and national levels).

Such an alert system could help predict epidemic outbreaks weeks in advance, helping local authorities take steps before massive loss of life.

In the future, it is possible that comprehensive monitoring of physical, chemical and biological parameters in combination with super-computing will give us the capability to predict and prepare for such human health issues as the next outbreak of diseases like Malaria, West Nile Virus or SARS.

Slide 13 Support Sustainable Agriculture

Agricultural production is dependent on healthy environment & sound agricultural planning. A healthy environment entails reducing soil erosion, protecting water resources, and reducing pollution. It is necessary to conduct land use assessments to understand suitability & productivity.

EO help us produce maps & digital terrain models (satellites), map vegetation & land use; Gather info on air humidity & soil moisture, as well as, the quantity & the seasonal variation of precipitation. EO can help monitor the effects of climate change on agriculture & help to predict droughts, harvests & potential crop damage.

Clearly no one single action can increase agricultural production as all the many factors involved need to be taken into account. This is valuable information for governments & stakeholders trying to estimate requirements in areas at risk.

The Goal of the Famine Early Warning Systems Network (FEWS NET) is to strengthen the abilities of African countries & regional organizations to manage risk of food insecurity through the provision of timely & analytical early warning & vulnerability information. (International, national, & regional partners). Professionals in the US & Africa monitor various data & information—including remotely sensed data & ground-based meteorological, crop & rangeland conditions—as early indications of potential threats to food security.

Slide 14 Combat Desertification & Drought

In a more detailed discussion of hazards, **drought is one that affects virtually all regions of the world**. For example, the majority of the **world's population most severely affected by desertification and drought live in Asia**. Out of a total land area of 4.3 million km², Asia contains some 1.7 million km² of dry sub-humid, semi-arid, and arid land.

Drought has implications across the spectrum – **affecting agricultural production, water supply, and wildfires**.

The U.S. is also not immune. **FEMA estimates annual losses in the United States due to drought at $6-8 billion**. Drought is particularly severe in the **Western United States, currently in its fifth year**.

One recommendation of the **international plan to address drought is to develop a fully integrated *in situ* and satellite-based observation service for on-time drought early warning systems**.

The **U.S. Plan also echoes the importance of developing a drought early warning system**.

Slide 15 Improve Energy Resource Management

Gulf of Mexico Production:
5.1 trillion cubic feet of natural gas per year, - 27% of U.S. production
More than 1.2 million barrels of crude oil per day – 21% of U.S. production
6400 producing wells
4000 active platforms
29,000 miles of pipelines

Value is based on analysis of pre-2000 hurricane forecast information

As increases in production shift more to deep-water tracts which are more vulnerable to storm events, value of hurricane forecasts information will likely rise.

Slide 16 The GEOSS architecture (schematic)

- describes how components fit together in a system of systems. We're not creating a big international data base or a single new system. But rather, we are using the resources of all of the participating Nations and organizations to create a network of systems. This system of systems will better satisfy user needs than the individual components or system of which it is composed.

Slide 17 US Contribution to GEOSS: US Integrated Earth Observation System

The U.S. contribution to GEOSS is The U.S. Integrated Earth Observation System (IOES). The vision is to enable a healthy public, economy, and planet through integrated, comprehensive and sustained Earth observations. The U.S. strategic plan identifies the U.S. capabilities are part of the systems of systems, both nationally and internationally. It builds on existing observing capabilities, and highlights the need to fill gaps where they exist. It uses common standards and is compatible with the international architecture.

Slide 18 Strong National Support

In the United States, **5 U.S. Government Cabinet Secretaries and 2 senior White House officials** participated in the first Earth Observation Summit.

Since then, **15 U.S. Government agencies and 3 White House Offices** have come together to devise a plan to integrate their respective observing systems, as well as provide input into the global plan. The plan has been approved.

Greg Withee, Assistant Administrator for NOAA's Satellite and Information Services, **Ghassem Asrar**, NASA's Science Deputy Associate Administrator for Science at NASA, and **Cliff Gabriel**, White House OSTP, are co-chairs of that interagency group.

Slide 19 Near-Term Opportunities

Because **there is currently no comprehensive and integrated strategy for communicating existing data**, data management is highlighted as both an overarching need, and the **necessary first near-term action** for this integrated system.

Several **other near-term opportunities** are identified in this section of the U.S. Strategic Plan that can be supported by the Office of Management and Budget's Research and Development Investment Criteria (Quality, Performance, and Relevance), and that can be achieved in a relatively short period of time.

Clear plans have been developed for these opportunities, which **are relevant to national priorities, agency missions, and customer needs**. The identified observations needs are high-priority and multi-year in their goals, with tangible results easily identified. These potential outcomes cut across all societal benefit areas identified in this strategy.

Slide 20 IEOS Benefits

The IEOS Societal benefits areas are similar but distinct from GEOSS areas, for example: The international concern is for Weather Forecasting and the IEOS focus is on improving Weather Forecasting.
These are the nine IEOS Societal Benefits of IEOS:

Improve Weather Forecasting; Reduce Loss of Life and Property from Disasters; Protect and Monitor our Ocean Resource; Understand, Assess, Predict, Mitigate, and Adapt to Climate Variability and Change; Support Sustainable Agriculture and Forestry, and Combat Land Degradation; Understand the Effect of Environmental Factors on Human Health and Well-Being; Develop the capacity to Make Ecological Forecasts; Protect and Monitor Water Resources; Monitor and Manage Energy Resources

These benefit areas are National priorities. IEOS can improve coordination of strategies and observation systems, link all platforms: in situ, aircraft, and satellite networks, and identify gaps in capacity by facilitating the exchange of data and providing adequate info to decision-makers.

Slide 21 Role for Geospatial Data Community

It will take the entire community to reach our global vision for an integrated system of observation systems. As a community we have identified a need for one coordinated system, and recognized that there are data sharing challenges associated with differences in policy and financial restraints that we all face. However, there is a role for each of us to play in developing a global system of systems.

We can all provide global, regional, and national framework data to underpin GEOSS.

Providing that global, regional, and national framework data further supports the U.S. and International spatial data initiatives such as the GSDI, NSDI and Global Map.

Slide 22 Role Education, Technology Transfer, Outreach

To further our goals to creating a system of systems we recognize there are additional needs, education, technology transfer, and outreach…

Slide 23 GEOSS Architecture

(Schematic)

Slide 24 Earth Observation Information (Summary)

The success and benefits derived up to this point have been because of the strong support and collaboration undertaken by the community as a whole. This remarkable journey is far from over -- but if we continue to leverage our individual resources toward improving Global Earth Observation capabilities internationally, our technical capabilities can ensure an interoperable

system of systems. Efficient and effective data integration and exchange is possible if we all do our part. Thank you and I’m will leave you with the website information where you can learn more about the international and U.S. Plan, and I look forward to answering any questions you may have.